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ABSTRACT

The role of the computer as manager of instruction in special education is discussed. In Part 1, basic computer terms are introduced under the major headings of data measurement, hardware, and software. Part 2 focuses on selection criteria for microcomputers. Suggestions for evaluating software are given in terms of ease of use, documentation, dealer support, and flexibility. Considerations for hardware selection are explained to center on capacity, storage, input/output, and service. Aspects of matching the existing data collection procedures with computerization are addressed, and sample files for recordkeeping are described. (CL)

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A SOFT SELL FOR HARDWARE:

THE USE OF MICROCOMPUTER TECHNOLOGY FOR

COST EFFECTIVE SPECIAL EDUCATION MANAGEMENT

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A Soft Sell for Hardware: The Use of
Microcomputer Technology for Cost Effective
Special Education Management

Many of you in the audience this evening are probably much more experienced with microcomputers than we are while others of you are at the same level of expertise. And finally, some of you may believe that computers are too complex to ever be understood by you. However it is important to remember that car salesmen differ from car mechanics in their understanding of the automobile yet both are recognized as being knowledgeable about the vehicle. Those knowledgeable about computer uses for education differ from those who uderstand the technical aspects of the computer.

We are not computer whizzes but we recognize that the computer age is here. The electronic capabilities that allow the imprinting of thousands of complex circuits on a silicone chip smaller than a postage stamp and the replacement of hundreds of moving parts by one microprocessor have ushered in this era of the microcomputer. As a result the microcomputer is invading the educational system at all levels. Educators must become involved in the development of this technology for educational applications.

In developing educational computer literacy there are three areas that need to be examined. These include the use of the microcomputer as the Object of Instruction, the Medium of Instruction and the Manager of Instruction. How to operate the computer, how the

computer operates and the impact of a rapidly changing computer technology on society constitute the computer as the Object of Instruction.

The computer as the Medium of Instruction had its beginnings in and still has its major emphasis on Computer Assisted Instruction(CAI). Other applications include Inquiry, Simulation and Problem Solving all of which involve the use of more sophisticated instructional applications.

Finally , the computer can be the Manager of Instruction by aiding the teacher or administrator in storing and retrieving pertinent student data. Analysis of this data can also be accomplished with the computer. The computer allows us to be managers of data rather than just collectors of information.

This presentation will focus on the computer as the Manager of Instruction and will include two parts. Part One will be an introduction to basic computer terminology and Part Two will address considerations for the selection of software and hardware, effective data collection and information management and the potential for and possible methods of structuring a computer based Special Education Management System.

Our purpose is to share some of what we have learned so far, especially those concepts that will aid you in advising your districts in the selection of a computer system. Most important, we challenge your ot plunge into the world of the microcomputer and discover its seemingly limitless potential.

Part One

Computerese has been defined as a peculiar dialect, spoken and written by computer initiates for the gratification of their egos. It is also necessary to have a basic understanding of this dialect when talking with your local computer salesperson or communicating with your children. The Glossary gives a brief definition of some of this ego building lingo but the terms will be further explained by presenting them under the major headings of Data Measurement, Hardware and Software.

Data Measurement

A microcomputer is simply a series of boxes connected by wires but by itself this computer is incapable of relating to humans. Instructions and Data are necessary for an interrelationship to occur. However, there is a limit to the amount of data the computer can handle at one time so a system for data measurement is necessary.

The terms associated with data measurement are bytes and bits. Bytes or characters, numbers, letters or spaces are the fundamental unit for communicating with the computer. For example, the letter "A", the number "3", a ? or a space each constitute a byte. The statement, "The Computer Age is Exciting!" is equal to thirty bytes. Bits are the computer's fundamental unit or the smallest unit of data that a computer works with. They are the binary system of zeros and ones. Eight bits areapproximately one byte so the letter "K" is simply a series of eight zeros and ones arranged in a given order.

Hardware

Hardware refers to the actual physical equipment of the computer. The following outline lists the terms associated with hardware in a more meaningful framework.

I CPU - Mainframe
  A. Processor
  B. Main Memory
    1. ROM
    2. RAM
    3. Bus
II Ports
III Peripherals

CPU and Mainframe are terms referring to the internal hardware components of the computer. These components include the processor and main memory. The processor performs the calculations and interprets the data and its size is measured in bits. Main Memory stores the data and instructions that the processor needs and receives the results of the processor's work. Its size is measured by the number of bytes it can hold.

There are two kinds of main memory, ROM or Read Only Memory and RAM or Random Access Memory. ROM is the memory where information is permanently stored. It contains the wake-up instructions that turn the computer on. Information and programs are stored in RAM. This is the memory the user interacts with. It is important to remember that when the power is turned off all data in RAM is lost.

In summary, the processor size is measured in bits while main memory size is measured in bytes. An 8 bit system with 64 kilobytes of main memory refers to the size of the processor, 8 bits and the size of main memory, 64 kilobytes.

Bus refers to the internal wires that data travel along. The bus

size must match the processor size.

Ports or plugs are the outlets on the computer tat allow the addition of peripherals or external devices. The number available is important as one port is needed for every peripheral that is added to the CPU.

External Devices or Peripherals send information to or receive information from the computer. They include, secondary storage devices and input/output devices. Since main memory is limited in size and data is lost when the power is turned off secondary storage is necessary if data is to be stored. These devices include floppy and hard disks, cassette tapes and punched cards.

Input/Output Devices allow the user to get information into and out of the computer. Input devices include the CRT or screen and the keyboard. Output devices include the CRT which allows the user to see what is being entered as well as what is already in the computer and printers which provide a hard copy of the data that is in the computer.

Software

Software is the set of instructions that command the computer and allow the user to interact with and take advantage of the computer's talents. Terms associated with software will be presented in the following framework.

I Application Programs
  A. Word Processing
  B. Data Base Management System(DBMS)
  C. Accounting Systems
II Source Programs
  A. BASIC
  B. COBAL
  C. FORTRAN
III Operating System

Application Programs are the programs that contain a set of instructions that tell the computer how to do a specific task. They include word processing which is a method of recording, editing and storing written reports, letters and IEPs, data base management which is a program that handles the storage and retrieval of data entered under specific headings and accounting programs that allow the user to enter figures and formulas to be used in the calculations that the computer performs.

Source Programs, also known as high level language or programming language include BASIC, COBAL AND FORTRAN. The computer takes this source program and translates it into the binary system for processing.

The Operating System is the traffic cop of the computer. It keeps the data flowing between the CPU and the peripherals. The Application Program must be compatable with the Operating System.

Summary

Bits and bytes refer to data measurement. CPU, processor, main memory, ports and peripherals all refer to the hardware with the size of the processor being measured in bits and the size of main memory being measured in bytes. The number of ports controls the number of peripherals that can be attached to the CPU. Application Programs, Source Programs and Operating Systems are terms that refer to the software that allows the computer to perform specific operations desired by the user.

While no one can fully understand the computer from reading a vocabulary list, hopefully this brief lesson in computerese will aid your "inputting" of computer lingo.

Part 2

The search for the right microcomputer should begin by analyzing how you will use the computer. The specific uses you have in mind will help determine both hardware and software needs. There are several questions you need to answer. These fall into three main categories: What, Where, and Who.

1. What processes do you want to use the microcomputer for? For example; predicting, forecasting, and budget computations, or word processing for letters, mailings, and IEP's or student information files.

2. If a school site is intended for microcomputer placement, will the same hardware be used for both computer assisted instruction and administrative uses? Some hardware may be inappropriate for both uses.

3. How much data must the system be able to handle? Central Office data needs will be quite different from those of a school site.

4. Will the same hardware be used throughout the district for both school site and central office uses?

5. Who will use the microcomputer? Secretaries, teachers, administrators, psychologists?

6. Will multi-user timesharing be used? An example of this could be at a high school with a large special education department. A CPU would be hooked up to several screens and keyboards with a printer or two. The screens

and keyboards could be used by teachers, psychologists, secretaries, department heads, etc.

A common mistake made by school districts is buying hardware first and then trying to find software that will run on that machine. The system is only as good as the software used. Therefore software should be selected prior to purchasing hardware.

There are some basic questions to be answered when evaluating software. These can be grouped under four main headings: Ease of Use, Documentation, Dealer Support, and Flexibility.

1. Ease of Use: Is the software user oriented? A well designed software package should take between two and six hours of training to master. Many software packages include practice disks and training lessons. The personnel who will actually use the software should try it out before purchase.

Secondly, is the software menu-driven? The menu lists the choices and gives instructions on how to execute the desired choice. The following is an example of a menu from Profile II, a data base management system.

PROFILE II MENU

0. Directory
1. Define Data Formats
2. Define Screen Formats
3. Define Report Formats
4. Define Label Formats
5. Define Selection Formats
6. Expand Existing File
7. Inquire, Update, Add
8. Print Reports
9. Print Labels
A. Select Records
Y. Exit

Figure 1

For example, if you wanted to set up a file of students in your special education program, you would choose #1, Define Data Formats. The microcomputer would then lead you through setting up your fields. Field #1 would probably be LAST NAME OR LAST NAME, FIRST NAME. Subsequent fields would include parent's name, address, school, handicapping condition, etc. The set of fields on each student would make up a record. All of the records would comprise a file. If you wanted a report of students by type of program you would select #3, Define Data Formats. Once the report format was set up, you would choose #8, Print Reports.

2. Documentation: Does the software selected have complete concise documentation including an easy to

understand operator's manual? It is really necessary to sit down at the microcomputer and try to follow the steps outlined in the manual before buying the package. What seemed very clear to the programmer who designed the package may be frustratingly unclear to the novice who buys the package and tries to use it on his own.

Do software brochures and demonstration materials show the data capacity of the system? How much Main Memory will the software package use? How much room on the disk is taken up by directions to the computer? Some software packages may leave little room for the amount of information you want to put in. All compatible hardware should be listed. What machines can you use this software on? Examples of reports should also be shown in the manual. You need to know if this software package can generate the kinds of reports you need.

3. Dealer Support: Does the software dealer offer support even after the sale is made? Replacing defective merchandise, correcting program errors, providing updates if new improved packages are developed, providing effective training programs, and clearly spelling out maintenance provisions are areas to consider. Keep in mind that payment terms are a key part of the negotiations for installation. In other words, the system should be installed and operating before final payment is made.

4. Flexibility: Are the input-output and processing capabilities of the package flexible enough to accomodate your changing needs now and in the forseeable future? Is it possible for non-technicians such as yourself to modify the structure of the reports?

Ratings of software are published in computer journals and research service guides such as Data Pro. Another good source of information is another user. Ask the dealer for names of people using the package. Check with other districts using the software to see how well it works for them and any difficulties they may have encountered.

Once the software has been selected, hardware choices are narrowed. Important considerations in selecting hardware include: Capacity, Storage, Input/Output, and Service.

1. Capacity: This refers to the size of both the Central Processing Unit (CPU) and Main Memory. For administrative uses the CPU should be a 16 bit system. Main Memory should be at least 48 to 64 KB.

2. Storage: The most commonly used storage devices for microcomputers are floppy disks. Hard disks are becoming available, however. The basic differences between floppy disks and hard disks are durability, storage capacity, and expense. Floppy disks must be handled

carefully. Dust, heat, finger marks, and warping caused by improper storage can damage the disks. Hard disk systems are sealed systems and are therefore less susceptible to damage.

Floppy disks come in two sizes: 5¼" and 8" diameter. 5¼" disks have a storage capacity of 75,000 bytes; 8" disks have a storage capacity of 315,000 bytes. Hard disks are available in 8" and 14" diameters and have a storage capacity of 75,000 to 315,000 bytes. To give an example: One special education student's records including IEP data could contain 10,000 bytes. A 5¼" floppy disk would hold only about 7 such records. 5¼" or 8" floppy disks used to store large amounts of data could conceivably create a new filing problem and require a file to find a file.

Hard disk systems are initially expensive but, in light of the rapidly developing and constantly changing computer technology, one can assume that reasonably priced hard disk packs will be widely available for microcomputers in the next few years.

3. Input/Output Devices: The type and number of input and output devices needed is an important consideration when choosing hardware. The ports or connecting plugs on the computer itself (the CPU) determine both the number and type of devices that can be used. Input considerations include the type of keyboard and location

of specific keys. The keyboard should be as close as possible to an actual typewriter for ease of use. Output devices include the CRT (screen) and printers. The number of positions on the screen (columns by rows) is important to think about. Some screens show only part of a line of print. There are basically two types of printers: Dot Matrix and Letter Quality. Dot matrix printers may be adequate for your needs if reports, mailing labels, and lists are all that is needed. Letter quality printers produce a higher quality printed copy, and you may want this type of printing for letters. However letter quality printers are typically slower.

3. Service: As with the purchase of software, the availability of service including warranty, maintenance, update provisions, and guaranteed delivery date must be considered. Warranty provisions and maintenance contracts need to be negotiated before the system is purchased to assure maximum computer up-time.

In summary, in selecting software and hardware:

1. Define specifically what you want to use the microcomputer for.
2. Research available software and hardware.
3. Buy the most reliable software and hardware that meets your present and projected needs.

Before one can address the actual uses of computer technology in special education administration, a close look must be taken at the components of good data collection and information management. The computer ALONE is not a data processing system! An efficient management program will combine present data collection methods with computerization. An effective data collection and information management system must incorporate the information needed to to administer an accountable special education program. Some basic considerations include:

1. The data collection procedures should be directly related to identification, assessment, and placement procedures.

2. The system should be designed to meet the record keeping and data needs of both direct service and supervisory personnel.

3. The system should be able to accomodate changes in information needs among special education programs.

Information should be designed to incorporate several planning or reporting functions. The following are examples of information needs in special education administration that can be met more effectively with computerization than with manual processing. In other words, all the files of information that are now kept by direct service and supervisory personnel in numerous file

cabinets and 5x8" card files could be stored in the microcomputer and accessed as necessary.

Masterfile: lists of all special education students and lists by categories, schools, etc.

Scheduling: for schools, transportation, resource programs, related services, and personnel

Reporting: for example-interim progress reports on IEP goals for parents and regular class teachers.

Attendance Reports

Research: This could include relationships between variables such as type of placement, age at entry into special education, handicapping condition, etc.

Student Identification: Files of basic information so that the reports on ethnicity, federal employees, federal housing, free lunch, etc. could be accessed directly from the microcomputer rather than endless forms for the teacher.

Historical Data: Including medical and psychological

Student Directory: Emergency phone numbers, etc.

Mailing by Activity: Mailing lists, mailing labels, and letters can be generated on the microcomputer. The microcomputer could identify all students whose reevaluation date is upcoming, insert the appropriate items in the blanks in a letter and address the labels. Figure 2 is an example of such a letter.

Dear

It is time for the annual review of IEP. Please indicate the most convenient time for you to attend a meeting at the school. will be reevaluated before the meeting. If you have any specific requests please indicate them on the bottom of the appointment form.

The following people will attend the meeting:

___Classroom Teacher	___Resource Specialist
___Counselor	___Administrator
___Itinerant Teacher	___Psychologist
___Adaptive P.E.	___Social Worker

Please indicate your 1st, 2nd, and 3rd choice of meeting times. If you have any questions please call 222-8097.

DATE	TIME
_____	_____
_____	_____
_____	_____

REMARKS_____

_____

_____

Figure 2

Record Keeping: The multitude of records kept on special education student by a district can be put into the micro-computer and accessed as needed.

Testing: Results are easily accessible and readily available in one place.

Given the amount of data available with this "Student System" one would be able to compile the information necessary for compliance monitoring and for insuring compliance such as:

1. lists of incomplete records (unsigned IEPs).
2. child counts cross referenced by age, program, and handicapping condition.
3. audit trails for program projections and reimbursement.
4. budget and program projections and reimbursement computations according to state and federal formulas.

It will also allow analysis for management information required not only by administrators but by teachers and specialists as well.

A total management system should be the goal not the immediate objective. To build a computer management system, schools may begin with one or two applications specific to their needs.

For example, a school or district could purchase a Data Base Management System and a Word Processing System both of which are software. The necessary hardware would include a CPU with 48 to 64 kilobytes of main memory, a CRT with an 80 by 24 column screen so that an entire line of text can be seen, a printer, either Dot Matrix or Leter Quality and a disk drive expansion unit or a hard disk system.

With this configuration, a district could begin transportation scheduling, student files or individualized program records. The word processor could be used to write letters to parents and generate curriculum guides. The two working together could generate more comprehensive reports and information analysis. It is important to remember that in order to do this efficiently ample secondary storage is critical.

The cost of this configuration is presented in the following outline. The price ranges reflect the sophistication and quality of the product.

I Software
DBMS—$100.00 to $1000.00
Word Processor—$100.00 to $800.00

II Hardware
Computer—$2,500.00 to $8000.00
Printer—$300.00 to $700.00 for Dot Matrix
$2,000.00 for Leter Quality
Disk Drive Expansion—$850.00 to $3,000.00
Hard Disk System— $2,000.00 and up

III Additional Costs
Paper—$40.00 per box
Disks—$5.95 for 5¼"
$7.50 for 8"
Printer ribbon—$15.00
Cables—$50.00
Maintenance—about 10% of the purchase price
Furniture— as needed

An important rule to remember when budgeting for a computer system is to plan to spend 50% of the total cost of the hardware on software. The system will only be as good as the software that runs it.

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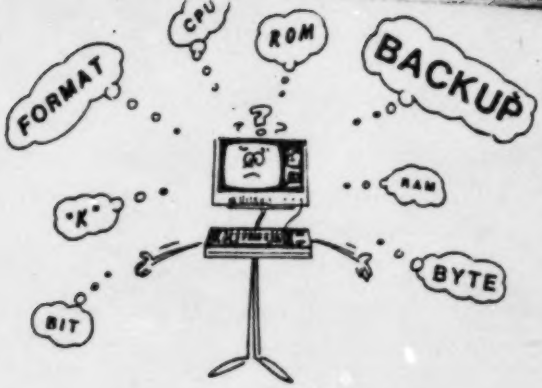

GLOSSARY

BACKUP - A COPY OF AN ORIGINAL DISK.

BASIC - BEGINNERS ALL-PURPOSE INSTRUCTION CODE - THE MOST WIDELY USED PROGRAMMING LANGUAGE FOR MICROCOMPUTERS.

BINARY - THE BASE TWO NUMBER SYSTEM USED BY COMPUTERS.

BIT - THE SMALLEST UNIT OF DATA PROCESSED BY THE COMPUTER.

BUS - THE COMMUNICATION LINES THAT TRANSMIT INFORMATION BETWEEN THE PROCESSOR AND MAIN MEMORY AND MAIN MEMORY AND THE PORTS.

BYTE - 8 BITS - ONE BYTE EQUALS ONE CHARACTER (A LETTER OR A NUMBER OR A SPACE.

COMPUTER - A BOX THAT FOLLOWS A PLAN. BY ITSELF IT IS A MASS OF ELECTRONIC CIRCUITS INCAPABLE OF INTERACTION WITH HUMANS.

CONTROLLER - A DEVICE THAT MAKES THE ELECTRONIC SIGNALS FROM PERIPHERALS (EXTERNAL DEVICES) COMPATIBLE WITH THE BUS.

CPU OR MAINFRAME - THE INTERNAL HARDWARE COMPONENTS OF THE COMPUTER.

CRT - CATHODE RAY TUBE - THE VIDEO TERMINAL OR SCREEN WHICH DISPLAYS INFORMATION.

DBMS - DATA BASE MANAGEMENT SYSTEM - A PROGRAM THAT HANDLES ALL STORAGE AND RETRIEVAL OF INFORMATION.

DISK DRIVE - THE DEVICE THAT HOLDS, ROTATES AND PHYSICALLY ASSESSES THE

DOT MATRIX PRINTER - A PRINTER WHICH FORMS EACH CHARACTER BY A PATTERN OF DOTS.

FLOPPY DISK - A STORAGE DISK WITH A FLEXIBLE MAGNETIC RECORDING SURFACE.

HARD DISK - RIGID PLATTERS 8" OR 14" IN DIAMETER, CAPABLE OF STORING MILLIONS OF DATA BITS.

HARDWARE - THE MECHANICAL, ELECTRICAL AND MAGNETIC PARTS OF THE COMPUTER.

INPUT - ANY MEANS OF PUTTING INFORMATION INTO THE COMPUTER.

KILOBYTE - 1,000 BYTES

LETTER QUALITY PRINTER - A PRINTER WHICH FORMS SOLID LINE CHARACTERS (LIKE A TYPEWRITER).

MAIN MEMORY - CIRCUITS THAT STORE THE DATA AND INSTRUCTIONS THAT A PROCESSOR NEEDS AND RECEIVES AND STORES THE RESULTS BACK FROM THE PROCESSOR.

MEMORY - CIRCUITS THAT STORE INFORMATION AT SPECIFIC LOCATIONS.

MODEM - A TELECOMMUNICATIONS DEVICE THAT ALLOWS COMPUTER INFORMATION TO TRAVEL OVER TELEPHONE LINES.

OPERATING SYSTEM - THE TRAFFIC COP OF THE COMPUTER, COMMUNICATES WITH THE USER, HANDLES ALL INTERRUPTIONS AND ALL REQUESTS FOR DATA AND PROGRAMS.

OUTPUT - ANY MEANS OF RECEIVING INFORMATION FROM THE COMPUTER.

PERIPHERAL - ANY DEVICE THAT CAN SEND INFORMATION TO OR RECEIVE INFORMATION FROM A COMPUTER.

PORT - PLUGS WHERE EXTERNAL HARDWARE COMPONENTS ARE CONNECTED TO THE CPU.

PROCESSOR - TAKES DATA AND INSTRUCTIONS FROM MAIN MEMORY, PROCESSES THE INFORMATION, AND SENDS RESULTS BACK TO MAIN MEMORY.

PROGRAM - A SET OF INSTRUCTIONS THAT TELLS A COMPUTER WHAT TO DO AND HOW TO DO IT.

SECONDARY STORAGE - TAPES OR DISKS WHICH STORE DATA.

SOFTWARE - INSTRUCTIONS AND DATA THAT COMMAND THE COMPUTER OR ENABLE THE COMPUTER TO FUNCTION.

RAM - RANDOM ACCESS MEMORY; THE MEMORY WITH WHICH USERS ARE INVOLVED; ANY ITEM CAN BE IMMEDIATELY RETRIEVED; RAM IS LOST WHEN POWER IS TURNED OFF.

ROM - READ ONLY MEMORY: WAKE UP INSTRUCTIONS FOR THE COMPUTER: A USER CANNOT PUT ANYTHING INTO ROM.

TIME SHARE SYSTEM - A SYSTEM WHICH ALLOWS TWO OR MORE USERS TO ACCESS A COMPUTER AT THE SAME TIME BY SERVING EACH USER IN TURN FOR A SHORT PERIOD OF TIME UNTIL THEIR JOBS ARE COMPLETED.

WORD PROCESSING - A WAY OF STORING AND EDITING WHAT HAS BEEN WRITTEN.